Drew Technologies, Inc.

# CarDAQ-Plus User Manual

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## CarDAQ-Plus Overview

The CarDAQ-Plus is the most advanced vehicle communications device on the market. It can be used as a fully-compliant J2534 "PassThru" device or as an embedded computer with on-board J2534 functions. The CarDAQ-Plus is useful for bus monitoring/flight recording, diagnostics, calibration, script-based factory testing, ECU reprogramming, ECU simulation and many other tasks.

When used in J2534 PassThru mode, the CarDAQ-Plus sits between your vehicle and a PC or laptop. Applications on your PC use the J2534 API to communicate to the vehicle through the CarDAQ-Plus. Many J2534 applications are available today, including vehicle ECU re-flashing, and OBD-II compliance testing.

The CarDAQ-Plus goes beyond being a PassThru device. It is a computer running Linux with a web server, a file server, and an on-board development environment. It has two Compact Flash (CF) sockets for Wireless Ethernet, GPS or CF memory. The on-board compiler allows for development of custom data loggers, ECU simulators or re-flashing applications.

On the front of the CarDAQ-Plus (from left to right):

- (optional) A Compact Flash slot for installing expansion cards.
- If you did not request the Compact Flash (CF) slot, your unit may be sealed to prevent dust and dirt from getting into the unit. If you have a sealed unit and want to use the expansion port, contact Drew Technologies.
- Green Indicator light for Power and CF card status
- A black push button used to de-configure CF cards prior to removing them.
- A Green light indicating Ethernet connection (Status 1)
- A Green light indicating USB connection (Status 2)
- A Green light indicating Wireless connection (Status 3)
- An Orange light indicating vehicle communication traffic (Status 4)
- A Red light for Error indications (Status 5)
- An USB port.

On the back of the CarDAQ-Plus (from left to right):

- The vehicle connector for the OBD-II (J1962) cable.
- The auxiliary banana plug for cars that require an off-bus programming voltage.
- The analog input connector for measuring voltage levels (you can also measure temperatures with the Drew Technologies TempDAQ.)
- The Ethernet port for communicating to a PC with indicators for Link and Activity.

For detailed information on the various connectors see Around the CarDAQ-Plus.

## CarDAQ-Plus Features

The CarDAQ-Plus can communicate with a Vehicle on the following protocols:

- High speed CAN (SAE J2284 Dual-Wire CAN-C up to 1Mbps), including ISO15765-4
- Medium speed CAN
- Single-Wire CAN (SAE J2411 Class B up to 80Kbps), including GMLAN 2.2 (GMW3089)
- GM Class2 (J1850VPW at 10.416Kbps or 41.666Kbps)
- Ford SCP (J1850PWM at 41.666Kbps or 83.333Kbps), including reprogramming voltage (FEPS)
- ISO9141/ISO14230/KWP2000 (any speed)
- DaimlerChrysler SCI (SAE J2610 full or half duplex, at 7.8Kbps, 62.5Kbps, or 12.5Kbps) including reprogramming voltages
- Protocols that require a reprogramming voltage (5-20V) on an Aux banana jack
- Jaguar reprogramming (ability to ground pin 12)
- Other cars (ability to ground pin 9)

Additional features of the CarDAQ-Plus:

- Rugged aluminum enclosure (1" H x 5.25" W x 7.5" D)
- Optical/Magnetic isolation on communication ports for noise immunity
- 6 Analog inputs (2000 samples per second, 0-27v, 12 bit resolution)
- 2 Compact Flash slots (one internal, one on front panel)
- Takes standard CF Memory, 802.11 Wireless Ethernet cards, GPS cards
- 6 LEDs (under software control), one push button
- On-board web server, a file server, telnet server
- On-board compiler/assembler/linker for development.

## SAE J2534

SAE J2534 is a standard developed by the Society of Automotive Engineers. It defines an API that allows programs to talk to vehicle hardware in a standard way. Each PassThru device comes with a DLL that abstracts the specifics of their device into the standard API.

The goal of this API is to make all J2534 devices interchangeable, in the same way that printers are interchangeable. Any application that needs to print can just call a standard API, without worrying about the specifics of the hardware or even how the hardware is connected (USB, Serial or Wireless).

Even though J2534 devices are interchangeable, not all J2534 devices are the same. The CarDAQ-Plus has many features that go beyond J2534. It is an open platform for development. The CarDAQ family is recommended by all the major OEMs for vehicle reprogramming. The CarDAQ-Plus is supported by Drew Technologies, the world leader in J2534 devices.

Just like choosing a printer, choosing a J2534 device requires consideration of features, speed, reliability, support, warranty, expansion capability and extras.

### Where to get J2534 Software

Software for use with the CarDAQ-Plus can come from several places:

**The Vehicle OEMs:** Most vehicle manufacturers have a reprogramming application that can upgrade the software in their ECUs. Consult the Equipment and Tool Institute website (http://etools.org/) for a list.

**Other 3rd parties:** As the J2534 standard matures, there will be more 3rd party applications available (i.e. Scan Tool software, performance measurements, network analysis, etc.)

**DrewTech:** Our website and SDK contain some sample programs for testing the API. These will be mainly useful for programmers.

**Custom software:** This is only limited by your imagination: Data logging, Diagnostics, Calibration, Reprogramming, etc. To get started, consult the CarDAQ-Plus API Developer's Manual, and/or the CarDAQ-Plus SDK Manual. If you would rather outsource software development, contact Drew Technologies for a list of qualified software consultants.

## Information for Software Developers

Customers developing custom software for use on a PC or on the CarDAQ-Plus should be familiar with the SAE J2534 API. This is covered in the *CarDAQ-Plus API Manual*. It is highly recommended that you purchase the J2534 specification from the Society of Automotive Engineers (http://www.sae.org/). For those already familiar with the J2534 API, the *CarDAQ-Plus Extensions Manual* covers CarDAQ-specific features and extensions. There are also sample programs available on the Drew Technologies website.

Once a programmer is familiar with J2534, he or she can begin writing programs. If the programs are written in a portable fashion, they can be run on Windows (connecting to the CarDAQ-Plus from a PC via Ethernet) or on Linux (running right on the CarDAQ-Plus). Programs written for the CarDAQ-Plus will also run on the ScanDAQ 1170. For information on developing programs to run directly on the CarDAQ-Plus, download the **CarDAQ-Plus SDK** (Software Development Kit). The SDK is free and there are no royalties to pay. The CarDAQ-Plus is an open platform, which means you don't need anyone's permission to write or sell applications.

## Initial Setup of the CarDAQ-Plus

First, the CarDAQ-Plus needs a power source. The MVCI to OBD-II cable allows powering the CarDAQ-Plus from a vehicle. Most vehicles built after 1996 have an OBD-II connector somewhere under the dash on the driver's side, as specified in SAE J1962. Do not leave the CarDAQ-Plus plugged in to an inactive vehicle for several days, as it may drain the vehicle battery. When using the CarDAQ-Plus on a bench, put power on pin 16 (VBATT) and ground on pin 5 (Signal Ground).

Second, the CarDAQ-Plus is connected to a PC (or laptop). The next four sections explain different ways to configure your PC to talk to the CarDAQ-Plus. Most customers will find the first section the simplest.

Note: These sections assume the CarDAQ-Plus networking mode has not been changed, or the CarDAQ-Plus has been booted in recovery mode. For information about customizing the CarDAQ-Plus boot mode, see

CarDAQ-Plus has been carefully designed and tested to comply with OBDII protocols, which are used on most 1996 and newer cars and light trucks sold in the USA. However, some vehicle models are not in full compliance with these protocols for various reasons. In addition, the computer control systems or sensors on any given vehicle may be malfunctioning or out of specification.

Vehicles manufactured for use outside of the USA may not comply with OBDII protocols, even though an SAE J1962 connector is located in the vehicle. Connection to vehicles manufactured for use outside of the USA is AT YOUR OWN RISK. Drew Technologies will not be held responsible for ANY direct, indirect or consequential damage that arises as a result of connecting to such a vehicle.

Before installing CarDAQ-Plus, be sure to review the list of known vehicle exclusions and anomalies. For more information on OBDII issues and anomalies in general, we recommend The Equipment and Tool Institute's website at www.etools.org.

While Drew Tech's testing and the experience of hundreds of CarDAQ-Plus users have shown the unit to be safe and reliable, there is an inherent risk in adding any after-market product that may potentially affect the operation or drive-ability of your vehicle. Drew Technologies will not be held responsible for ANY direct, indirect or consequential damage that arises as a result of connecting to a vehicle.

If you are concerned about the operation of your vehicle at any time while using CarDAQ-Plus:

* If you are driving, pull off the roadway immediately or as soon as it is safe to do so.
* Disconnect CarDAQ-Plus from the OBDII port.
* Consult a licensed mechanic or automobile service center.

Report any issues or concerns to our Technical Support Dept. at support@drewtech.com. We are open Monday through Friday, 9:00 a.m. to 5:30 p.m. Eastern Time. We maintain an active database of the feedback we receive, and your comments can help us continuously improve the product.

Appendix A: Customizing the CarDAQ-Plus Networking mode. You can change the boot mode to make the CarDAQ-Plus boot faster and eliminate the need to boot the CarDAQ-Plus before booting the PC.

After connecting to the CarDAQ-Plus, skip to the section "Installing the J2534 DLL."

## Direct-connect with automatic network configuration

Most computers will ask the network for configuration at boot. The CarDAQ-Plus can send this configuration so your computer and the CarDAQ-Plus can communicate.

Procedure for automatic network configuration:

1. Connect the direct-connect Ethernet cable (which is blue with red ends) between PC and the CarDAQ-Plus.

2. Connect power to the CarDAQ-Plus. Verify that the Ethernet Link LED (on the upper right of the Ethernet port) is on. Wait for the front panel LEDs to stop scrolling.
3. Verify that the green 'Power' light on the front panel is on.
4. Finally, turn on the PC. If the computer is already on, reboot.
5. On the PC, start a web browser and enter http://192.168.43.101/ in the location bar.

If the CarDAQ-Plus 'About' page is not displayed, see the Troubleshooting Guide. Common problems:

- Your computer's network card should be set to "Obtain an IP address automatically". For step-by-step instructions to set your computer to be a DHCP client, see Appendix B: Instructions for configuring your network card.
- Your web browser should not be using a web proxy.
- Some personal firewall programs may need to be disabled or configured to allow access to the CarDAQ-Plus.

## Direct-connect with manual network configuration

Using manual network configuration (Fixed IP Addressing) requires a little work up front, but eliminates the need to power the CarDAQ-Plus before booting your computer.

Procedure for Fixed IP addressing:

1. On your computer, find your network card configuration. Turn off "Obtain an IP address automatically" and enter the IP address **192.168.43.102** and the netmask **255.255.255.0**. For step-by-step instructions on setting up your computer for Fixed IP addressing, see Appendix B: Instructions for configuring your network card.
2. Connect power and Ethernet cables to the CarDAQ-Plus. Use the direct-connect cable (blue with red ends) when connecting directly to the PC (without an Ethernet hub).
3. Wait for the Orange 'Busy' light on the front to stop blinking.
4. Verify that the Ethernet Link light (on the upper right of the Ethernet port) is on.
5. Verify that the green Heartbeat LED is blinking in a regular pattern, two beats per second. This means that the CarDAQ-Plus is in DHCP server mode.
6. On your PC or laptop, start a web browser and enter http://192.168.43.101/ in the location bar.

If the CarDAQ-Plus 'About' page is not displayed, see the Troubleshooting Guide.

## Connecting to an existing network with automatic addressing

Most corporate networks or home networks have a DHCP server for automatic network configuration. The CarDAQ-Plus can use this server, as long as the network is connected before power is applied. It is recommended that the CarDAQ-Plus boot mode be changed to **Client only** see

CarDAQ-Plus has been carefully designed and tested to comply with OBDII protocols, which are used on most 1996 and newer cars and light trucks sold in the USA. However, some vehicle models are not in full compliance with these protocols for various reasons. In addition, the computer control systems or sensors on any given vehicle may be malfunctioning or out of specification.

Vehicles manufactured for use outside of the USA may not comply with OBDII protocols, even though an SAE J1962 connector is located in the vehicle. Connection to vehicles manufactured for use outside of the USA is AT YOUR OWN RISK. Drew Technologies will not be held responsible for ANY direct, indirect or consequential damage that arises as a result of connecting to such a vehicle.

Before installing CarDAQ-Plus, be sure to review the list of known vehicle exclusions and anomalies. For more information on OBDII issues and anomalies in general, we recommend The Equipment and Tool Institute's website at www.etools.org.

While Drew Tech's testing and the experience of hundreds of CarDAQ-Plus users have shown the unit to be safe and reliable, there is an inherent risk in adding any after-market product that may potentially affect the operation or drive-ability of your vehicle. Drew Technologies will not be held responsible for ANY direct, indirect or consequential damage that arises as a result of connecting to a vehicle.

If you are concerned about the operation of your vehicle at any time while using CarDAQ-Plus:

* If you are driving, pull off the roadway immediately or as soon as it is safe to do so.
* Disconnect CarDAQ-Plus from the OBDII port.
* Consult a licensed mechanic or automobile service center.

Report any issues or concerns to our Technical Support Dept. at support@drewtech.com. We are open Monday through Friday, 9:00 a.m. to 5:30 p.m. Eastern Time. We maintain an active database of the feedback we receive, and your comments can help us continuously improve the product.

Appendix A: Customizing the CarDAQ-Plus Networking mode.

Procedure to connect the CarDAQ-Plus to an existing network:

1. Disconnect power from the CarDAQ-Plus.
2. Use the standard Ethernet cable (black) to connect the CarDAQ-Plus to your network. One end goes into the CarDAQ-Plus Ethernet port, the other goes to a hub, switch, or wall jack.
3. Apply power to the CarDAQ-Plus. Verify that the Ethernet Link light (on the upper right of Ethernet port) is on while booting.
4. Wait for the Orange 'Busy indicator' light to stop blinking.
5. Verify that the green 'Heartbeat' light is blinking in a pattern that alternates between one beat and two beats in each second. If the 'Heartbeat' light blinks in a different pattern, no DHCP server was not found on your network. Disconnect immediately and contact the network administrator.
6. Wait a few minutes for the CarDAQ-Plus to register itself in Windows networking. This registration time is only required for finding the CarDAQ-Plus web page by name--It is not required for PassThru operation.
7. After the CarDAQ-Plus is registered, start a web browser and enter http://CARDAQPLUS/ in the location bar.

If the CarDAQ-Plus 'About' page is not displayed, see the Troubleshooting Guide or talk to the network administrator.

## Wireless networking with manual network configuration

This example requires changing your computer configuration to match the default CarDAQ-Plus wireless settings. If you have an existing wireless setup, it may be easier to configure the CarDAQ-Plus to match your current wireless settings instead. In this case, you will have to use one of the above methods to contact the CarDAQ-Plus on the wired network so you can change the default the wireless settings.

Currently, the Wireless interface only supports Fixed IP Addressing.

Procedure for networking to the CarDAQ-Plus, using the default Wireless settings:

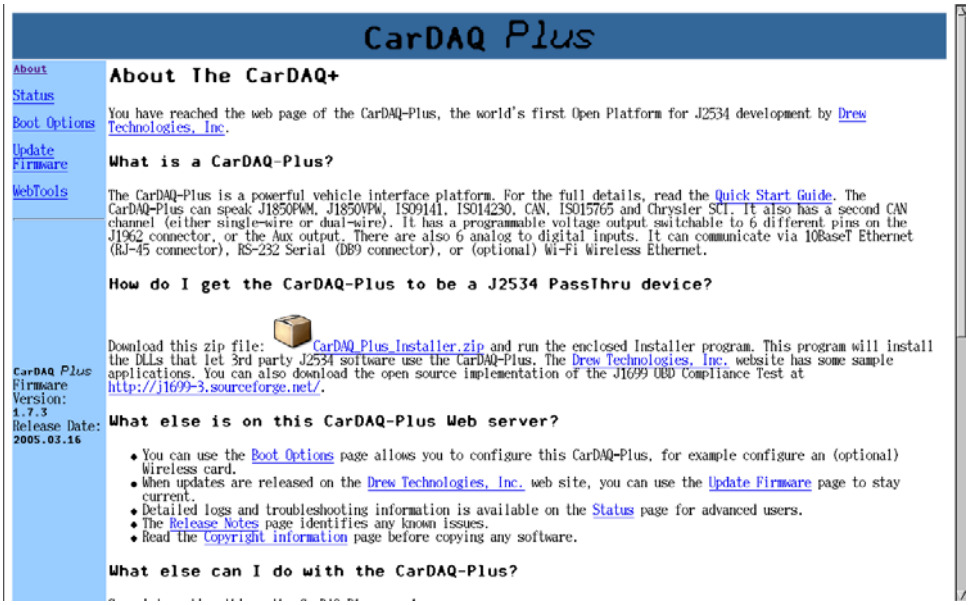
1. Insert a Wireless Ethernet card into the CarDAQ-Plus front CF slot.
2. Connect power to the CarDAQ-Plus.
3. Wait for the green light next to the Compact Flash slot to light up. If this light does not come on, it may be that your wireless card is not supported.
4. Wait for the Orange 'Busy' light on the front to stop blinking.
5. On your computer, configure your wireless Ethernet card.
6. Windows XP: Go to the network control panel and select the wireless network name ("default") from the list. Disable "Obtain an IP address automatically" and set the IP address to **172.16.1.2**, and the netmask to **255.255.255.0**.
7. Other operating systems:
8. Follow the instructions in Appendix B: Instructions for configuring your network card for Fixed IP address configuration. Use **172.16.1.2** for the IP address and **255.255.255.0** for the netmask.

9. Find the configuration program that came with your wireless card. Enter the following: ESSID/Network name: **default**, Mode: **Ad-Hoc** or **IBSS**, Channel: **11**, Rate: **Auto**, WEP: **off**
10. On your PC or laptop, start a web browser and enter http://172.16.1.1/ in the location bar.

If the CarDAQ-Plus 'About' page is not displayed, you should try connecting to the CarDAQ-Plus using wired Ethernet and verify the wireless settings.

## Installing the J2534 DLLs

The CarDAQ-Plus J2534 DLLs must be installed before applications can use the CarDAQ-Plus. Follow these directions to install or upgrade the DLLs:


CarDAQ Plus
About
Status
Boot Options
Update Firmware
WebTools
CarDAQ Plus Firmware Version: 1.7.3
Release Date: 2005.03.16
About The CarDAQ+
You have reached the web page of the CarDAQ-Plus, the world's first Open Platform for J2534 development by Drew Technologies, Inc.
What is a CarDAQ-Plus?
The CarDAQ-Plus is a powerful vehicle interface platform. For the full details, read the Quick Start Guide. The CarDAQ-Plus can speak J1850PWM, J1850VPW, ISO9141, ISO14230, CAN, ISO15765 and Chrysler SCI. It also has a second CAN channel (either single-wire or dual-wire). It has a programmable voltage output switchable to 6 different pins on the J1962 connector, or the Aux output. There are also 6 analog to digital inputs. It can communicate via 10BaseT Ethernet (RJ-45 connector), RS-232 Serial (DB9 connector), or (optional) Wi-Fi Wireless Ethernet.
How do I get the CarDAQ-Plus to be a J2534 PassThru device?
Download this zip file: CarDAQ_Plus_Installer.zip and run the enclosed Installer program. This program will install the DLLs that let 3rd party J2534 software use the CarDAQ-Plus. The Drew Technologies, Inc. website has some sample applications. You can also download the open source implementation of the J1699 OBD Compliance Test at http://j1699-3.sourceforge.net/.
What else is on this CarDAQ-Plus Web server?
You can use the Boot Options page allows you to configure this CarDAQ-Plus, for example configure an (optional) Wireless card.
When updates are released on the Drew Technologies, Inc. web site, you can use the Update Firmware page to stay current.
Detailed logs and troubleshooting information is available on the Status page for advanced users.
The Release Notes page identifies any known issues.
Read the Copyright information page before copying any software.
What else can I do with the CarDAQ-Plus?

1. Go to the CarDAQ-Plus web page (see Initial Setup of the CarDAQ-Plus).
2. On the main page, find the link to the **CarDAQ_Plus_Installer.zip** file, under the section heading **How do I get the CarDAQ-Plus to be a J2534 PassThru device?**
3. Click on the link and select **Save to disk**.
4. Extract the contents of the zip file to a temporary directory. (You may need to install WinZip or a similar utility.)
5. Find the directory where you extracted the zip file. Click on the executable program **CDPLUSinstall.exe**. This will install the J2534 DLLs and configure the registry.
6. (Optional) If you want to develop for the CarDAQ-Plus, copy the header/source files somewhere where your compiler can find them.
7. (Optional) Delete the temporary directory and the zip file.

# Next Steps

After verifying communication with your CarDAQ-Plus, you are ready to put it to use. Here are some of the next steps to take:

## Running J2534 software

Any J2534 application can use the CarDAQ-Plus to communicate with a vehicle. The website http://etools.org/ has links to the ECU re-flash applications from the OEMs.

Since J2534 allows multiple devices to be connected at once, you must tell the software you want to use the CarDAQ-Plus. Every application will have a different way to select the device, so consult the software manual.

The CarDAQ-Plus is fully compatible with the SAE J1699 OBD compliance test suite. Go to http://j1699-3.sf.net/ to download the application.

## Explore the CarDAQ-Plus web page

The CarDAQ-Plus web page contains several utilities such as: upgrade the firmware, change the boot options, view the files on the CF cards. New firmware releases will expand the on-board tools to include datalogging and simple scan-tool functionality.

Note: Some web pages require authentication. You should enter the username "root" and password "powerful".

## Multiple CarDAQs

You can easily put multiple devices on your network (wired or wireless). When more than one is available, a pop-up list will allow you to select the one you want.

## Debug DLLs

There are an alternate set of DLLs to aid in troubleshooting. These DLLs work just like the normal DLLs, except they generate a log of all J2534 calls. Sending a debug log to an application vendor will help them diagnose any problems. When enabled, the DLLs log to the file "DebugPlus.txt" in the application directory.

To activate the debug versions of the DLLs, run the CarDAQ-Plus installer from the command line like this: "CDPLSinstall.exe -d". To restore the normal DLLs, re-run the installer without the debug command.

Also useful for troubleshooting is the **Status** page on the CarDAQ-Plus.

## Expansion with CF Cards

The CarDAQ-Plus includes two Compact Flash expansion slots; one is an internal slot and the other is an externally accessible slot. The internal slot may only contain a factory-installed Compact Flash memory card. This is often used for data logging or as a 'hard drive' for developers using the SDK. Please contact Drew Technologies for pricing and information.

Note: By default, the CarDAQ-Plus ships without an opening for the Compact Flash slot to prevent dirt, grease, and liquid related damage. If necessary, contact Drew Technologies to have the front panel modified.

### Installing or Removing an Expansion Card

The external slot is for hot-swappable CF cards. When inserting a card, the green CF indicator light will come on when the device is recognized and configured. If the light does not come on, there may not be suitable drivers for your CF Card.

Always press the front panel switch and wait for the CF indicator light to go off before removing a CF card. Data corruption may result if a CF memory card is removed when the indicator light is on.

## Wireless Ethernet (Wi-Fi/802.11b)

When inserted, the CarDAQ-Plus will configure the card using the wireless settings from the Boot Options page. The default options are:

- IP address: 172.16.1.2
- Netmask: 255.255.255.0
- ESSID/Network name: default
- Mode: Ad-Hoc or IBSS
- Channel: 11
- Rate: Auto
- WEP: off

Once the CarDAQ-Plus and your PC are configured to have the same settings, no other configuration is needed. The CarDAQ-Plus J2534 DLL will automatically find devices on wired or wireless networks.

Cards known to work:

- Linksys "Instant Wireless" (models WCF11, WCF12)
- SMC "EZ Connect" (model SMC2642W)
- AmbiCom 802.11b Wireless Compact Flash Card (WL1100C-CF).

## CF Memory cards

Any size or brand CompactFlash memory card may be inserted into the front slot. Using the **WebTools** link, you can view the data on the card from any web browser. If the file server is enabled, the data on the card will appear in the **cf2** folder.

Consult the *CarDAQ-Plus SDK* for information on putting programs on CF cards. Different cards can change the "personality" of the CarDAQ-Plus, from a general purpose tool to a datalogger or ECU re-flasher.

## GPS Cards

The CarDAQ-Plus supports any CompactFlash GPS (Global Positioning System) card that uses the ASCII NMEA format.

Cards known to work:

- Deluo Electronics (Model: Compact Flash GPS)

# Expansion with the TempDAQ

The TempDAQ is a temperature compensated amplifier that scales 6 K-type thermocouple inputs to 0-27V for the CarDAQ-Plus analog connector. The TempDAQ also has BNC connectors to pass 0-27v range signals directly into the CarDAQ-Plus, without any re-scaling.

The TempDAQ allows the measurement of up to 6 temperatures in the range of -200°C to +1250°C with 2°C accuracy and better than 1°C of resolution.

## Updating the Firmware

From time to time, Drew Technologies will make firmware updates available on our website. Follow these instructions to update your CarDAQ-Plus:

1. Download the firmware file from our website to a temporary directory on your PC.
2. Go to the CarDAQ-Plus web page and click on the "Update Firmware" link.
3. Click the "Browse" button and select the firmware file you just downloaded.
4. Click "Go" to read the notes, then click "Update Firmware" to start the update.
5. The orange light on the CarDAQ-Plus will come on. Wait for the light to go off and stay off for several seconds before trying to use the CarDAQ-Plus.

Updating the firmware can take several minutes. If the CarDAQ-Plus loses power during an upgrade, you will have to use Recovery Mode (see the Recovery Mode section) to do the upgrade again.

> Note: When you upgrade the firmware, you will also want to upgrade the J2534 DLLs on your PC. See Installing the J2534 DLLs.

## Recovery Mode

Recovery mode is a special fail-safe mode of the CarDAQ-Plus. It is useful in case the normal firmware gets corrupted. It is also useful if the web server has been turned off, or if the IP settings are incorrect. It temporarily restores the CarDAQ-Plus to a known state. When booted in Recovery mode, the CarDAQ-Plus will try to become a DHCP client, but if that fails, it will become a DHCP server.

To enter recovery mode, hold down the front panel Push Button Switch while powering on the CarDAQ-Plus. In recovery mode, the following restrictions apply:

- Boot Option settings are ignored and defaults are used
- Wireless cards are not enabled
- J2534 PassThru applications cannot be used
- Normal operation is restored after rebooting the CarDAQ-Plus

## Around the CarDAQ-Plus

This section will get you familiar with the various lights and connectors on the CarDAQ-Plus.

## Indicators (Front Panel)

Indicators/buttons: (from left to right)

| Label | Color | Meaning |
|---|---|---|
| | Green | CF Card Configured |
| switch | Black | Remove CF/Recovery Mode |
| 1 | Green | Bus Data Receive |
| 2 | Green | Bus Data Transmit |
| 3 | Green | Heartbeat |
| 4 | Orange | Busy |
| 5 | Red | Error |

During normal operation, the Heartbeat LED will blink on once a second.

The Busy LED tracks the CPU usage of the CarDAQ-Plus. Most of the time the CPU will be idle, so the light will be off. The light will come on when the CarDAQ-Plus CPU is doing work.

The 'CF Card Configured' LED will come one when a Compact Flash card is inserted and recognized. Pressing the button will de-configure the card and turn the LED off, indicating that it is safe to remove the card. Removing the card while the LED is on may corrupt your CF card.

The Heartbeat light will blink to show the CarDAQ-Plus has power. The pattern of blinks also indicates the network mode as follows:

- One blink per second: Fixed IP address (Fixed only mode)
- Two blinks per second: CarDAQ-Plus has obtained an IP from the network (Client part of Client then Server, or Client only)
- One blink, then two blinks per second: CarDAQ-Plus is a DHCP server (Server part of Client then Server, or Server only)

The red Error LED is reserved for 3rd-party software control for error indications.

Note: Custom programs may alter the above indications.

## Serial Port (Front Panel)

The 9-pin DB9 serial connector is standard RS-232. It is isolated to prevent electrical interference from the vehicle to your PC.

Currently, the serial port is used only for debugging. Connection to the CarDAQ-Plus for PassThru mode via the serial port is not supported at this time. The debugging serial port parameters are 8N1 38400 baud.

| Pin # | Function |
|---|---|
| 1 | No connect |
| 2 | RX (to PC) |
| 3 | TX (from PC) |
| 4 | DTR |
| 5 | Ground |
| 6 | DSR |
| 7 | RTS (from PC) |
| 8 | CTS (to PC) |
| 9 | No connect |

## Compact Flash Connector (Front Panel)

The front panel Compact Flash connector can be used for most CF cards. The most popular are Flash data cards and 802.11b Wireless Ethernet cards.

Most Wireless Ethernet cards should be plug and play, once you configure the Wireless section of the Boot Options. When the card is recognized and ready, the Green LED between the CF connector and the Push Button Switch will light up. To remove the card, press the Push Button Switch and wait for the light to go out.

Note: Currently, CF Memory cards require manual configuration. This will be fixed in a later firmware release.

Note: Some models do not have a hole in the front panel to prevent dirt getting in the CF slot. Contact DrewTech for assistance.

## Ethernet Port (Back Panel)

The Ethernet port is a standard 10Base-T RJ-45 jack. Above the port are two LEDs. The upper right LED indicates that the Ethernet cord is connected at both ends. The upper left LED blinks when there is network activity.

Check the LEDs by the Ethernet connectors to verify the cable is correct. If the LEDs do not light up when both sides are powered up, try a different cable. For directly connecting to a laptop, you need the blue and red cable. For connecting to a hub or wall jack, you need the standard cable (black). Also, verify that your network supports 10Mbs operation.

## Analog Connector (Back Panel)

The analog connector uses a standard high-density DB15 connector.

The 12-bit analog inputs are setup for an input range of 0 to 27.5VDC and electrically protected against reverse voltage and over-voltage conditions. The VBatt output is fused at 200 mA with an automatic reset fuse.

| Pin # | Function |
|---|---|
| 1 | Power return Ground |
| 2 | Channel 6 |
| 3 | Ground |
| 4 | Channel 3 |
| 5 | Ground |
| 6 | V. Batt Out |
| 7 | Ground |
| 8 | Channel 4 |
| 9 | Ground |
| 10 | Channel 1 |
| 11 | Ground |
| 12 | Channel 5 |
| 13 | Ground |
| 14 | Channel 2 |
| 15 | Ground |

## Vehicle Connector (Back Panel)

The CarDAQ-Plus is powered from the vehicle connector. Leaving the CarDAQ-Plus plugged in to an inactive vehicle could drain the vehicle battery after several days.

The connection to the vehicle bus is a standard MVCI connector, using a High Density DB26. Drew Tech sells MVCI-J1962 connectors and banana plug connectors. The first 16 pins map directly to the SAE J1962 (OBD-II) connector. The next few pins are for identifying the cable.

| Pin # | Function |
|---|---|
| 1 | Single Wire |
| 2 | J1850PWM+ / J1850VPW |
| 3 | CAN2+ |
| 4 | Case Ground |
| 5 | Signal Ground |
| 6 | CAN+, SCI TX |
| 7 | ISO-9141 K-line, SCI RX |
| 8 | No connect |
| 9 | SCI TX, Programming Voltage, Short-to-Ground |
| 10 | J1850PWM |
| 11 | CAN2-, SCI TX, Programming Voltage, Short-to-Ground |
| 12 | Programming Voltage |
| 13 | Programming Voltage |
| 14 | CAN-, SCI TX, Programming Voltage |
| 15 | SCI RX, ISO-9141 L-line, Short-to-Ground |
| 16 | Vehicle Battery Input |
| 17 | Cable ID 2 |
| 18 | Cable ID 1 |
| 19 | No connect |
| 20 | No connect |
| 21 | No connect |
| 22 | No connect |
| 23 | +5V output (50 mA fuse) |
| 24 | No connect |
| 25 | No connect |
| 26 | Ground |

The Programming Voltage (5-20VDC) and Short-to-Ground functions are under software control. Normally, all communication lines are disconnected until connected via software control. The only exceptions are the J1850 lines, which are connected at boot time when in J2534 PassThru mode.

# Troubleshooting Guide

## Verify the CarDAQ-Plus is getting power

The CarDAQ-Plus gets power via the vehicle cable. When power is first applied to the CarDAQ-Plus, all the LEDs will come on briefly. While booting, the Orange 'busy indicator' light will blink. When the CarDAQ-Plus is done booting, the Orange light will stay off, but the green 'Heartbeat' light will blink. The pattern of blinking will indicate what mode the CarDAQ-Plus is in (see network configuration sections above.)

If no lights come on:

- Check that both sides of the vehicle cable are plugged in.
- Check that your vehicle battery is supplying 7-26V on pin 16, with ground on pin 5.

## Verify that Ethernet is connected

On the Ethernet port are 2 LEDs. The LED on the upper right indicates a good connection. It will light up when the Ethernet cord is connected at both ends, and both sides are getting power.

If the upper right Ethernet LED is not on:

- Double-check that both ends of the Ethernet cable are plugged in.
- Verify the Ethernet cable type. The direct-connect cable (blue with red ends) is used when connecting directly between the CarDAQ-Plus and your computer. In more complicated situations, try switching Ethernet cables (standard vs. direct-connect).
- Some cards can 'auto negotiate' the network speed, but this can sometimes fail. Go to the network control panel, get properties on your Ethernet card and look for a way to set the speed. Choose "10Mbs" instead of "auto detect" or "100Mbs", and "half-duplex" instead of "auto detect" or "full-duplex".
- Verify that your network supports 10Mbs half-duplex operation.

## Verify the network is configured correctly

There are two ways to do this: 1) Run a CarDAQ-Plus sample application and see if it connects. (Get sample applications from the Drew Tech website.) 2) Try to connect to the CarDAQ-Plus web page. Consult the networking section above for details.

If neither of these work, try:

- If your PC/Laptop is running firewall software, try turning it off to see if that is the problem.
- Pick a different connection method. For example, try the fixed IP addressing mode.
- Use recovery mode to make sure the CarDAQ-Plus is configured correctly. Recovery mode is entered by holding down the front button during power-on. See the *CarDAQ-Plus Manual* for details.

The CarDAQ-Plus web page works, but applications don't work:

- Your network settings may be incorrect. Specifically, verify that the CarDAQ-Plus netmask setting is the same as your PC/laptop's netmask setting.
- Your application may be looking for the wrong J2534 device. Make sure "CarDAQ-Plus" is selected.

If applications work, but not the CarDAQ-Plus web page:

- Verify that your web browser is not using a proxy. (Under Tools >> Options >> Local Area Network Settings)
- If your PC/Laptop is running firewall software, try turning it off to see if that is the problem.
- In DHCP Client mode, the IP address of the CarDAQ-Plus can change. Enter http://CARDAQPLUS/ in your browser, but only after waiting a few minutes for the CarDAQ-Plus to register itself on the network. Alternately, look at the logs for your network DHCP server.
- Use recovery mode to verify the CarDAQ-Plus has the correct settings.

## Verify application settings

If the CarDAQ-Plus works with some applications but not others, the problem is likely the application configuration. Each J2534 application will have configuration settings. Look for an option to change or select the J2534 DLL. Make sure that "Drew Technologies Inc. - CarDAQ-Plus" is selected.

If some applications work, but others do not:

- Call your application vendor for technical support.
- Run the application with the debug DLLs (see Debug DLLs).

## If all else fails...

Please contact Drew Technologies for technical support at 734-222-5228. If technical support finds it necessary for the unit to be returned for repair, you will be asked for your contact information and then provided with a Return Merchandise Authorization number (RMA#) that Drew Technologies will use to track the unit through the repair department back to you. Please write this number on the outside of your shipping box so it can be routed to the correct department.

If the necessary repair is not covered by Drew Technologies' warranty, you will be contacted for payment arrangements.

## Specifications

Operating Voltage Range: 7 to 26 Volts

Supply Current: 140ma Typical

Operating Temperature: 0 to 70 degrees C

Specifications subject to change without notice

CarDAQ-Plus has been carefully designed and tested to comply with OBDII protocols, which are used on most 1996 and newer cars and light trucks sold in the USA. However, some vehicle models are not in full compliance with these protocols for various reasons. In addition, the computer control systems or sensors on any given vehicle may be malfunctioning or out of specification.

Vehicles manufactured for use outside of the USA may not comply with OBDII protocols, even though an SAE J1962 connector is located in the vehicle. Connection to vehicles manufactured for use outside of the USA is AT YOUR OWN RISK. Drew Technologies will not be held responsible for ANY direct, indirect or consequential damage that arises as a result of connecting to such a vehicle.

Before installing CarDAQ-Plus, be sure to review the list of known vehicle exclusions and anomalies. For more information on OBDII issues and anomalies in general, we recommend The Equipment and Tool Institute's website at www.etools.org.

While Drew Tech's testing and the experience of hundreds of CarDAQ-Plus users have shown the unit to be safe and reliable, there is an inherent risk in adding any after-market product that may potentially affect the operation or drive-ability of your vehicle. Drew Technologies will not be held responsible for ANY direct, indirect or consequential damage that arises as a result of connecting to a vehicle.

If you are concerned about the operation of your vehicle at any time while using CarDAQ-Plus:

* If you are driving, pull off the roadway immediately or as soon as it is safe to do so.
* Disconnect CarDAQ-Plus from the OBDII port.
* Consult a licensed mechanic or automobile service center.

Report any issues or concerns to our Technical Support Dept. at support@drewtech.com. We are open Monday through Friday, 9:00 a.m. to 5:30 p.m. Eastern Time. We maintain an active database of the feedback we receive, and your comments can help us continuously improve the product.

# Appendix A: Customizing the CarDAQ-Plus Networking mode

One of the configurations in the previous section will work for most customers. Customers with advanced needs will find that the CarDAQ-Plus has very flexible networking abilities to fit different types of networks. There are many different networking modes involving various ways to setup a TCP/IP network. Most users can get started using the default mode (**"Client then Server"**). For advanced users, Appendix A describes how the CarDAQ-Plus can fit into various usage scenarios.

Goal 2: Integrate the CarDAQ-Plus into your existing network.

Sometimes, setting up the CarDAQ-Plus can be a multi-step process. For example, you may need to temporarily change your computer's network settings to talk to the CarDAQ-Plus default settings. Next, you configure the CarDAQ-Plus for your network. Lastly, you set your computer's networking back to normal.

## Configure Your CarDAQ-Plus and Configure Your Computer

Here is a compatibility chart on the different possible configurations. Across the top are the different possible computer settings, and down the left are the different possible CarDAQ-Plus settings. "Automatic" means that your network card is configured to 'Obtain IP address from network automatically' using DHCP. "Fixed" means that a specific IP address is entered.

| Setting | Automatic | Fixed IP (192.168.0.102) | Fixed IP (other) |
|---|---|---|---|
| Client then Server | Y | Y | |
| Client only | Y[1] | | |
| Server only | Y | Y | |
| Fixed only (192.168.0.1) | | Y | |
| Fixed only (other) | | | Y[2] |

The CarDAQ-Plus defaults to **Client then Server** mode (and most computers default to Automatic network configuration). This mode is flexible because you can easily switch back and forth between a corporate network and in-vehicle networking. On the other hand, you must follow the guidelines on power sequencing. Turning on the CarDAQ-Plus before plugging into your corporate network could cause problems.

The **Client only** mode is used for connecting the CarDAQ-Plus to an existing network that uses DHCP. Unlike the default mode, this prevents the CarDAQ-Plus from accidentally causing network problems. On the other hand, this mode does not work disconnected from the network (i.e. when using the direct-connect cable (for example, in a vehicle with a laptop).

The **Server only** mode is for use with laptops 'in the field.' The CarDAQ-Plus will boot 5 seconds faster. The drawback is that the CarDAQ-Plus may cause problems when plugged into an existing network.

The **Fixed only** mode is for use with an existing Fixed IP network or no existing network. The CarDAQ-Plus will boot 5 seconds faster than the default. If you have no existing network, you can use our example; otherwise you must ask your network administrator for help. Note that Dial-up and Wireless do not count as an "existing network" because we are discussing wired Ethernet.

## Configure the CarDAQ-Plus

To change the network mode, you will first need to get to the CarDAQ-Plus home page. If you have not changed the network mode, use the following procedure:

Procedure to use the CarDAQ-Plus directly with a computer (PC or laptop):

[1] This will only work if you plug the CarDAQ-Plus into a network with a DHCP server. It will not work with the direct-connect cable.
[2] Make sure your network administrator assigns your Fixed IP addresses.

1. Connect the direct-connect Ethernet cable (which is blue with red ends) between your computer and the CarDAQ-Plus.
2. Connect power to the CarDAQ-Plus. Verify that the Ethernet Link LED (on the upper right of the ethernet port) is on. Wait for the orange light on the front to stop blinking.
3. Verify that the green 'Heartbeat' light on the front panel is blinking in a regular pattern, two beats per second.
4. Finally, turn on your computer. If your computer is already on, reboot it to make sure that it searches for a new IP address.
5. On your computer, start a web browser and enter http://192.168.0.101/ in the location bar. If the CarDAQ-Plus 'About' page is not displayed, you need additional setup on your computer. See the section Configure Your Computer

Once you have the CarDAQ-Plus web page, click on the **Boot Options** link on the left hand side. At the top of the boot options page is the section on the Built-in Ethernet. Use the **network type** pull-down list to change the network type. You only need to fill in the next 3 boxes if you select **Fixed only**. After making changes, you will need to scroll to the bottom and click the **Save Settings** button. The settings won't take effect until the CarDAQ-Plus is powered off.

If you made changes to the settings, you may need to make changes to your computer's settings before communicating with the CarDAQ-Plus again.

## Configure Your Computer

Most computers are configured to automatically obtain an IP address from the network (using a protocol called DHCP).

To configure the **CarDAQ-Plus** for Fixed IP Address:

1. Disconnect the Ethernet and power cables from the CarDAQ-Plus.
2. Apply power to the CarDAQ-Plus and wait for the Orange light to stop blinking, then wait an additional 5 seconds.
3. Connect the Ethernet cable between your PC/laptop and the CarDAQ-Plus. The type of cable you need (normal or direct-connect) will depend on your network. Use the blue and red cable if you are connecting the CarDAQ-Plus directly to your laptop without an intervening hub or wall socket. If the LED on the upper right of the CarDAQ-Plus Ethernet port does not come on, see the troubleshooting section.
4. On your PC, start up a web browser such as Internet Explorer or Firefox.
5. In the **Location** box at the top of the screen, enter http://192.168.0.101/
6. You should see the CarDAQ-Plus home page. If not, see the Troubleshooting section.
7. Click on **Boot Options** on the left column.
8. Under **Built-in Ethernet**, set the **Network Type** to "Fixed Only". In **Fixed IP Address**, Enter 192.168.0.101 and in **Fixed Netmask** enter 255.255.255.0
9. Scroll to the bottom of the screen and select **Save Settings**. Wait a minute for the settings to be written to flash memory.

## Use Case 1: Vehicle and Bench

You plan on using the CarDAQ-Plus at your desk/bench when your laptop is connected to the corporate network, but you also want to use it in a vehicle. See the Use Case for Fixed IP networks if your network uses Fixed IP addressing. Also, look at the Use Case for Dual Networks to reduce traffic on your corporate LAN.

You need the flexibility of **Client then Server**. The CarDAQ-Plus will join your corporate network when you plug in at your desk, and the CarDAQ-Plus will automatically configure your laptop when you use it in the vehicle. The CarDAQ-Plus ships from the factory in this mode.

When using the CarDAQ-Plus on a corporate network, use the standard cable (black). When connecting directly to the CarDAQ-Plus (without an Ethernet hub), use the blue Ethernet cable with red ends.

Caveats:

- When you are at your desk, you must remember to plug the CarDAQ-Plus into your corporate network before applying power. If you power up before plugging into Ethernet, the CarDAQ-Plus will confuse your network by having 2 DHCP servers.
- When you are using the CarDAQ-Plus in a vehicle with your laptop boot your laptop only after connected to a powered CarDAQ-Plus, or reboot your laptop after connecting to the powered CarDAQ-Plus. (See section on DHCP renewal for a workaround.)
- When using the CarDAQ-Plus at your bench, you may be generating a lot of Ethernet traffic on the corporate LAN. Your IT department may prefer the Use Case for Dual Networks.

## Use Case 2: Vehicle Only

You plan on using the CarDAQ-Plus in a vehicle (or on a bench), but you do not plan on plugging the CarDAQ-Plus into an existing home/corporate network. You will only be using the direct-connect Ethernet cable which is blue with red ends.

You can configure the CarDAQ-Plus in one of two ways: **Server only** or **Fixed only**. Choose DHCP Server mode if you sometimes plug your computer into a corporate network that has a DHCP server. Otherwise, choose "Fixed IP".

Caveats:

- With either of these modes, be careful not to plug the CarDAQ-Plus into your corporate network, as that may cause network problems.

## Use Case 3: Bench Only

You plan on using the CarDAQ-Plus only at your desk/bench while your computer is connected to the corporate network. You will leave the CarDAQ-Plus connected to your corporate network all the time. If your network requires Fixed IP addressing, see the Use Case for Fixed IP networks. You may also want to look at the Use Case for Dual Networks.

You should configure the CarDAQ-Plus as **Client only**. The CarDAQ-Plus will join your corporate network when you plug in at your bench, and you can talk to it from your existing network connection. There is no chance that the CarDAQ-Plus will accidentally become a DHCP server and cause problems on your network.

Caveats:

- This method requires an additional Ethernet connection to your corporate network.
- All bus traffic will go over the corporate LAN. This may lead to performance problems.

## Use Case 4: Fixed IP networking

Your corporate network uses fixed IP addressing.

In this case, you should have your network administrator help you setup the CarDAQ-Plus for **Fixed only**. You will need to be assigned an IP address, a netmask, and optional gateway address. Even though this is more work to setup initially, it is very robust. You can use the CarDAQ-Plus directly (in a vehicle), or from your desk (with the CarDAQ-Plus and your laptop plugged into the corporate network). You do not need to worry about "boot order" problems.

When using the CarDAQ-Plus directly (with no Ethernet hub), use the direct-connect Ethernet cable (which is blue with red ends). Otherwise, use the standard cable (black).

Caveats:

- You will need assistance from your network administrator.

## Use Case 5: Dual Networks

Most PCs and Laptops can take multiple Ethernet cards. By purchasing a 2nd Ethernet card, it is possible to talk to both the corporate LAN and the CarDAQ-Plus, but keep the bus traffic off the corporate LAN. This is especially useful for developers working on a PC at a desk/bench.

Caveats:

- For laptops, it may be easier to use the built-in Ethernet with the CarDAQ-Plus, and use the add-on Ethernet for the corporate network.
- You will need assistance and co-operation from your network administrator, because the 2nd Ethernet card will need special network settings. Usually, it is configured as a private, Fixed IP network.
- Add-on Ethernet cards for Laptops are not as simple as they appear. The dongles break, and the cords get in the way. Consider Wireless, or an Ethernet card with built-in RJ-45 jack (i.e. no dongle).

## Use Case 6: Wireless

Before setting up the wireless, choose one of the other use cases for the wired Ethernet. Most of the time, the Vehicle Only Use Case will be appropriate if the wireless will be used most of the time.

Once you have configured the CarDAQ-Plus and your computer for wireless operation, you can switch back and forth between wireless and wired operation. No changes are needed to your applications. The CarDAQ-Plus J2534 DLL will search all available networks looking for your CarDAQ-Plus.

- If you want to configure your laptop to work with the default configuration of the CarDAQ-Plus, you need to use the following settings: set your ESSID to default, the Mode to Ad-Hoc, the Channel to 11, the Rate to Auto, and turn WEP off. Set your wireless card IP address to 172.16.1.2 and netmask to 255.255.255.0.

Caveats:

- If your CarDAQ-Plus does not have a slot in the front panel for the CF card, you will need to send it back to Drew Tech for modification.
- Currently, the wireless interface can only use Fixed IP addressing.
- You will need to configure your laptop for wireless. Unfortunately, every wireless card is set up differently. To add to the confusion, Windows XP has controls for managing wireless that may or may not work. You may need to use the network control panel to set the IP address/netmask if your wireless utility does not have those options.
- If you are connected to the CarDAQ-Plus with both wireless and wired interfaces, it will look like you have 2 CarDAQs. A window will pop up with the two interfaces listed so you can choose which interface to use.

# Appendix B: Instructions for configuring your network card

## Windows 95/98/ME Networking

To configure **Windows 95/98/ME** for DHCP:

1. From the Windows Start menu, choose **Settings >> Control Panel**.
2. Double-click on the **Network** icon.
3. Select the line that says "TCP/IP -> <YOUR ETHERNET CARD NAME>"
4. Click the **Properties** button.
5. Select the **IP Address** tab.
6. Select **Obtain an IP address automatically**.
7. Close the properties window by clicking **OK**.
8. Close the network window by clicking **OK**.
9. Before you reboot, make sure the CarDAQ-Plus is powered on and connected via Ethernet.

To configure **Windows 95/98** for a Fixed IP Address:

1. From the Windows Start menu, choose **Settings >> Control Panel**.
2. Double-click on the **Network** icon.
3. Select the line that says "TCP/IP -> <YOUR ETHERNET CARD NAME>"
4. Click the **Properties** button.
5. Select the **IP Address** tab.
6. Select **Specify an IP Address**.
7. In the IP Address field, enter **192.168.0.102**
8. In the Subnet Mask field, enter **255.255.255.0**
9. You will be prompted to reboot your computer.

## Windows NT Networking

To configure **Windows NT** for DHCP:

1. From the Windows Start menu, choose **Settings >> Control Panel**.
2. In the Control Panel, click on the Network.
3. Select the **Protocols** tab.
4. Choose the **TCP/IP Protocol**.
5. Click **Properties**.
6. Select the **IP Address** tab.
7. Select **Obtain an IP address from a DHCP server**.
8. Close the properties window by clicking **OK**.
9. Close the network window by clicking **OK**.
10. Before you reboot, make sure the CarDAQ-Plus is powered on and connected via Ethernet.

To configure **Windows NT** for a Fixed IP Address:

1. From the Windows Start menu, choose **Settings >> Control Panel**.
2. In the Control Panel, click on the Network.
3. Select the **Protocols** tab.
4. Choose the **TCP/IP Protocol**.
5. Click **Properties**.
6. Select the **IP Address** tab.
7. Select **Specify an IP Address**
8. In the IP Address field, enter **192.168.0.102**
9. In the Subnet Mask field, enter **255.255.255.0**
10. Close the properties window by clicking **OK**.
11. Close the network window by clicking **OK**.
12. You may need to reboot.
13. Follow the directions below to configure the CarDAQ-Plus for Fixed IP address.

## Windows 2000 Networking

To configure **Windows 2000** for DHCP:

1. From the Windows Start menu, choose **Settings >> Network and Dial-up Connections >> Local Area Connection**.
2. Right-click on **Local Area Connection** and select **Properties**.
3. On the General tab, choose **Internet Protocol (TCP/IP)** then click **Properties**.
4. Select **Obtain an IP address automatically** and **Obtain DNS server address automatically**.
5. Click **OK**
6. Close the **My Network Places** window
7. Make sure the CarDAQ-Plus is powered on and connected via Ethernet, then reboot your PC/laptop.

To configure **Windows 2000** for a Fixed IP Address:

1. From the Windows Start menu, choose **Settings >> Network and Dial-up Connections >> Local Area Connection**.
2. Right-click on **Local Area Connection** and select **Properties**.
3. On the General tab, choose **Internet Protocol (TCP/IP)** then click **Properties**.
4. Select **Use the following IP Address**
5. In the IP Address field, enter **192.168.0.102**
6. In the Subnet Mask field, enter **255.255.255.0**
7. Close the window by clicking **OK**.

## Windows XP Networking

To configure **Windows XP** for DHCP:

1. From the Windows Start menu, choose **My Network Places**.
2. Click on the **View Network Connection** in the Network Tasks frame in the upper left corner.
3. Right-click on **Local Area Connection** and select **Properties**.
4. On the General tab, highlight **Internet Protocol (TCP/IP)** then click the **Properties** button.
5. Select **Obtain an IP address automatically** and **Obtain DNS server address automatically**.
6. Click **OK**
7. Make sure the CarDAQ-Plus is powered on and connected via Ethernet
8. Double-click the **Local Area Connection** icon
9. Select the **Support** tab.
10. The CarDAQ-Plus should have assigned your computer an IP address of **192.168.0.102**. If not, make sure the CarDAQ-Plus is powered on and connected via Ethernet and click the **Repair** button.

To configure **Windows XP** for a Fixed IP Address:

1. From the Windows Start menu, choose **My Network Places**.
2. Click on the **View Network Connection** in the Network Tasks frame in the upper left corner.
3. Right-click on **Local Area Connection** and select **Properties**.
4. On the General tab, highlight **Internet Protocol (TCP/IP)** then click the **Properties** button.
5. Select **Use the following IP Address**
6. In the IP Address field, enter **192.168.0.102**
7. In the Subnet Mask field, enter **255.255.255.0**
8. Close the window by clicking **OK**.
9. Click on **Close**.